

AbstractID: 5136 Title: Commissioning of a Six-Degree-of-Freedom Robotic Patient Positioning System in a Proton Gantry.

Purpose: To report on commissioning of a robotic patient positioning system with six degrees of freedom and three digital radiographic panels in a gantry for proton radiotherapy.

Method and Materials: A new proton gantry with a robotic patient positioner was commissioned in early 2006. The patient positioning “couch” is a Motoman UP200 industrial robot with six degrees of freedom. Image-guided patient positioning is done with three digital radiographic panels and the DIPS software system. DIPS is in use elsewhere, but this was the first time it is used with three X-Ray sources and panels instead of one or two. The beamline and gantry-90 panels are mounted on retractable arms, and an additional gantry-axis panel swings down from above the patient and does not rotate with the gantry. We believe this was the first time an industrial robot was used for patient positioning in a proton gantry. The presentation includes in overview commissioning methods, which involve theodolites, room lasers, and testing with phantoms.

Results: The patient positioning system meets tight clinical specifications demanded for proton radiotherapy. It is capable of correcting patient position in all six degrees of freedom, namely position in X/Y/Z, pitch, roll, and rotation about the vertical. The first patient treatment with this system will have taken place shortly prior to the 2006 AAPM meeting.

Conclusion: This patient positioning system is unique, and provides greater degrees of freedom to adjust patient position than conventional ones. It is early to judge its clinical performance just as it comes online, but we are optimistic about the outcome.